# Incident Summary #II-964050-2020 (#16298) (FINAL)

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| SUPPORTING INFORMATION | Incident Date | | January 7, 2020 |
| | Location | | Peace River Region |
| | Regulated industry sector | | Boilers, PV & refrigeration - Boiler and pressure vessel system |
| | Impact – Injury | Qty injuries | 0 |
| | | Injury description | None |
| | | Injury rating | None |
| | Impact – Damage | Damage description | Damage to cooler tubes, louvers and cooler assembly. |
| | | Damage rating | Moderate |
| | Incident rating | | Moderate |
| | Incident overview | | At 06:15 AM Jan 7, 2020, the Operator was on site and received an alarm for the compressor building. Several minutes later the plant experienced an Emergency Shut Down alarm and shutdown on Fire detection. The Operator headed out of the office towards the compressor and seen the fire by the compressor building. The Operator evacuated out of the plant and called supervisors. Compressor was then shut down and blinded off. |
| INVESTIGATION CONCLUSIONS | Site, system and components | | The compressor is used to increase gas pressure so the gas can be further processed. Connected to the compressor is a cooler, known as an aerial cooler, similar to a cars radiator it takes outside air to cool both the compressor “radiator” fluid and compressed gas. The aerial cooler is made up of many small tubes which the air passes over during the cooling process. One of the tubes ruptured allowing gas being cooled within it to come in contact with an electric motor driving the cooler fan; a fire resulted damaging the cooler. |
| | Failure scenario(s) | | A tube ruptured in an aerial cooler connected to a compressor unit, releasing combustible gas which then contacted an electric motor and ignited, causing a fire. Summary of possible contributing factors:<br>- Ambient temperatures may have contributed to freezing of the cooler tubes<br>- Gas leaking from the tube may have been ignited by the electric motor<br>- Fan motor was not designed as an explosion proof fan |
| | Facts and evidence | | Summary of evidence and facts determined in the investigation of this incident:<br>- Site temperatures on the day of the incident were reported between minus 30 and minus 40 degrees centigrade.<br>- A metallurgical was engaged to conduct failure analysis. The metallurgical engineer reported that it is likely that the tube rupture was due to condensate freezing inside the tubes which contributed to the failure of the tube. |

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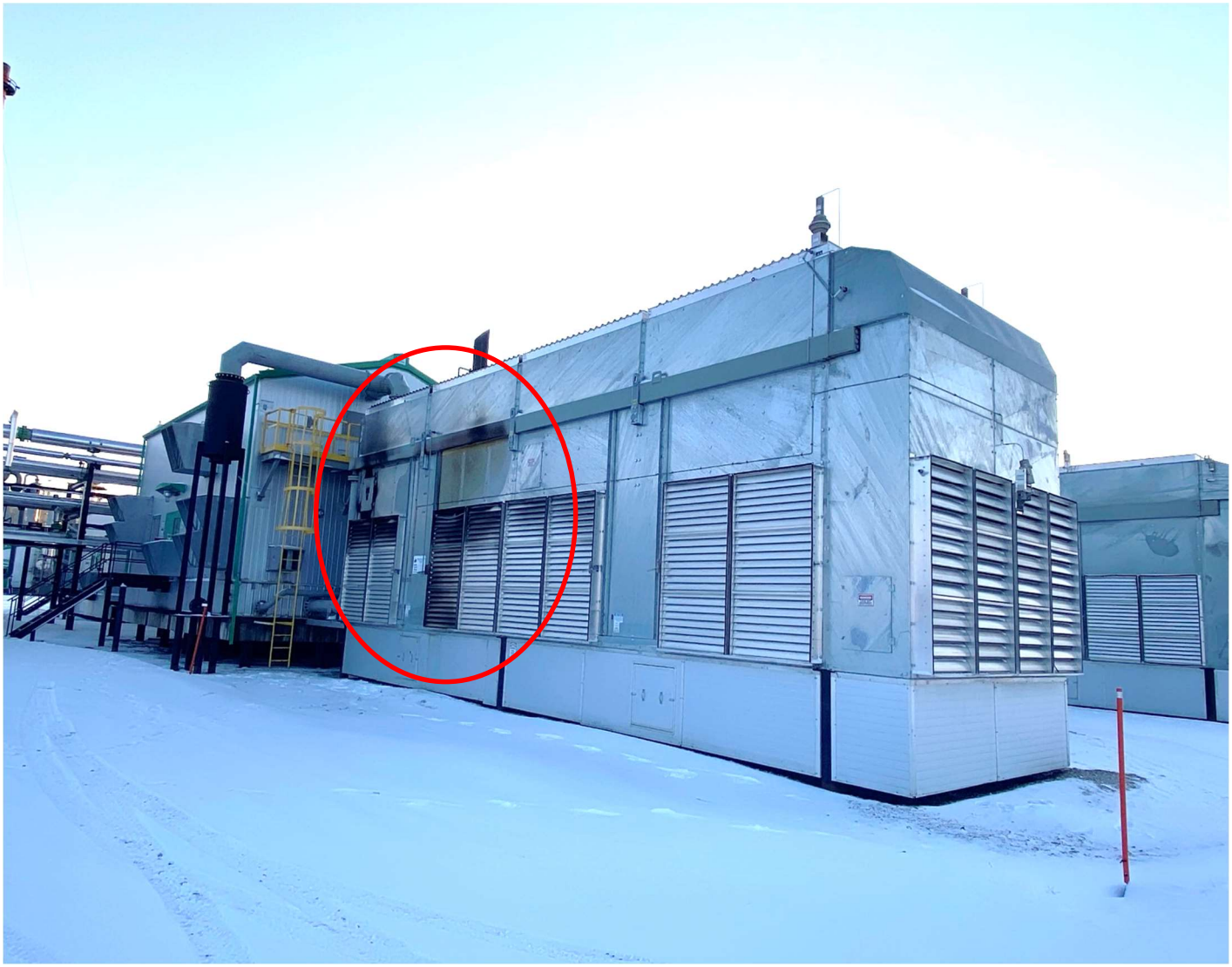
| | - A third-party investigator reported that the vents on top of the cooler were in the closed position during the colder temperatures, and may have provided a path for the leaking gas to circulate down towards the electrical fan motor which was likely the source of ignition.<br><br>- The fan motor was reported to be class 1 division 2 rated and although weatherproof, was not explosion proof. |
| Causes and contributing factors | It is probable that low ambient temperatures contributed to ~~the~~ freezing of the cooler tube resulting in the tube failure. It is also plausible that the electric motor not being rated as explosion proof also contributed to the gas ignition resulting in fire damage. |

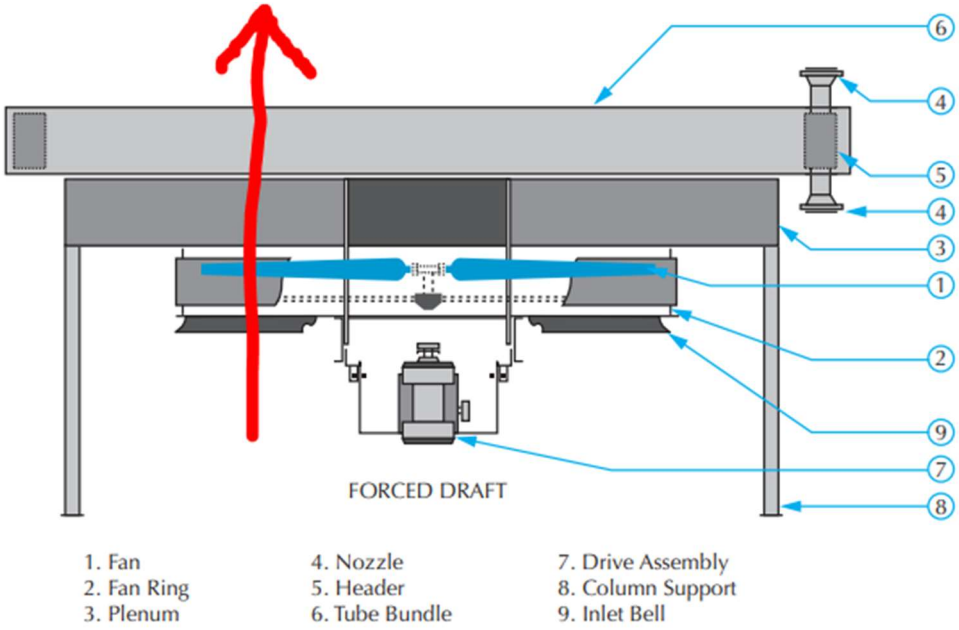
Photographs and Images (provided by third party investigators and metallurgical engineer)



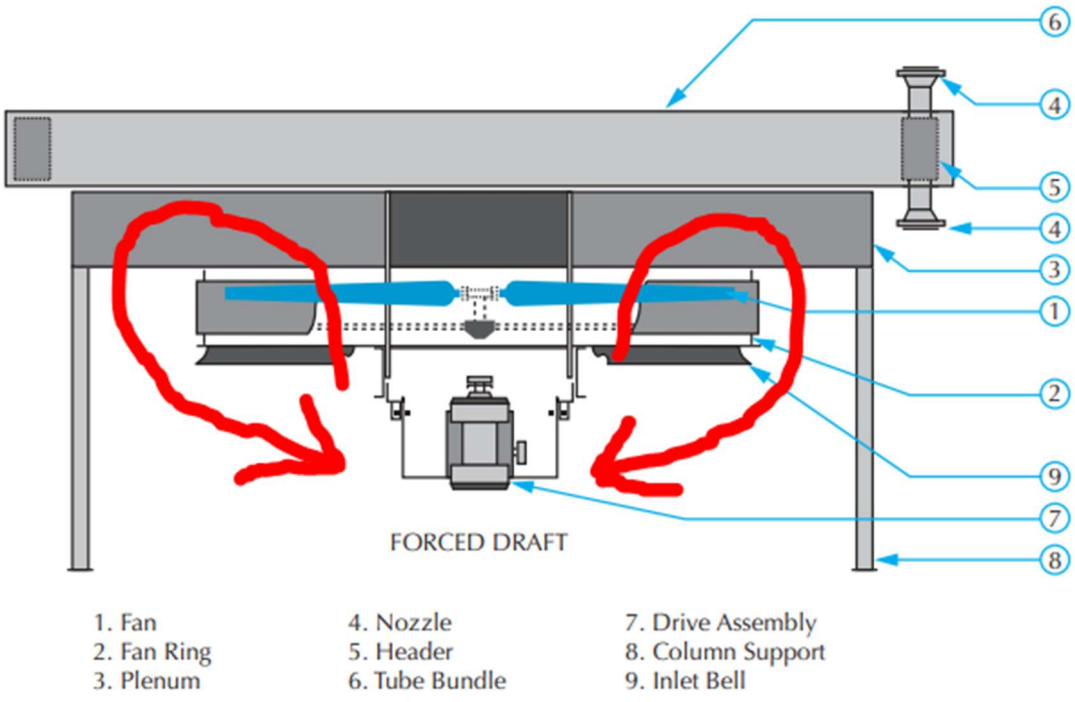
**Compressor Building (Left) with Cooler Fan Compartment (Right)**

**Red circle outlines area of fire damage**

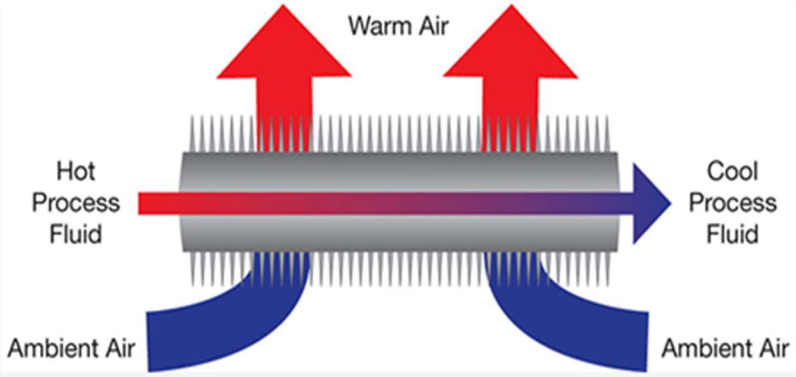
**Top of Cooler View**




**Side Illustration of Cooler Assembly- Red Arrow- Direction of Airflow with louvers open**




**Possible airflow with louvers closed – air directed back to electric motor/drive assembly**




▲**Figure 1.** In an air-cooled heat exchanger, hot process fluid flows through a finned tube. Ambient air passes over the finned tube, which cools the process fluid.

**Typical Tube – One of many side by side**

**Tube Rupture**

**Electric Fan Motor below tubes- wires cut for removal of Cooler**